MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2017/2018

ECP1016 – COMPUTER AND PROGRAM DESIGN

(ME / TE / RE)

26 OCTOBER 2017
09.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This Question paper consists of 5 pages including cover page with 4 Questions only.
2. Answer **ALL FOUR** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.

Question 1

(a) Determine the formatted output of the program given in Figure Q1.1. [5 marks]

```
int i = 123;
float *j, f = 12345.6789;
char s[] = "Sarawak";

j = &f;
printf("%.5d\n", i);
printf("%.3f\n", f);
printf("%.6g\n", *j);
printf("%.4s\n", s);
printf("%4c\n", s[2]);
```

Figure Q1.1

(b) Identify the programming errors in the following statements, and write the correct code.

(i) The following program segment inputs a real number from user, and stores the value in a `double` variable `num`, and then displays the value. [3 marks]

```
scanf("%f", &num);
printf("%d\n", *num);
```

(ii) The following program segment displays 3rd element of array `arr`. [3 marks]

```
int arr[3] = {1; 2; 3};
printf("%d", &arr[3]);
```

(c) Define a structure called `Country` to store the following information. [4 marks]

- Name (an array of 20 characters)
- Population (an integer)
- Area (a `float`)
- Code (an array of 2 characters)

(d) Figure Q1.2(a) shows the pseudocode for a program that inputs a string from user, and prints the string character by character separated by a space. A sample program output is given in Figure Q1.2(b).

```
i = 0
Prompt user for a string
Input string into array s

while the i-element of s is not a null character
   print the i-element of s followed by a space
   increment i by 1
```

Figure Q1.2(a)

```
Enter string:
Good day!
G o o d   d a y !

(texts in bold are user inputs)
```

Figure Q1.2(b)

Based on the pseudocode given, write a complete C program. [10 marks]

Continued...

Question 2

(a) Using a suitable selection statement, write a program segment that determines and prints whether the given integer variable `number` is a two digit number. [5 marks]

(b) Study the program segment given in Figure Q2.1.

```
while(i){
  printf("%d", (i%2));
  i=i/2;
}
```

Figure Q2.1

(i) Determine the formatted program output for $i = 4$ and $i = 10$. [3 marks]
(ii) Describe what the program segment does. [2 marks]

(c) Figure Q2.2 shows the flowchart for a program that inputs a nonzero positive integer from user, and displays all the positive factors of that number. A factor is a number that divides evenly into another number. For example, the factors of 15 are 1, 3, 5 and 15.

In the case that the integer entered is negative or zero, an error message should be printed, and the program should be exited immediately.

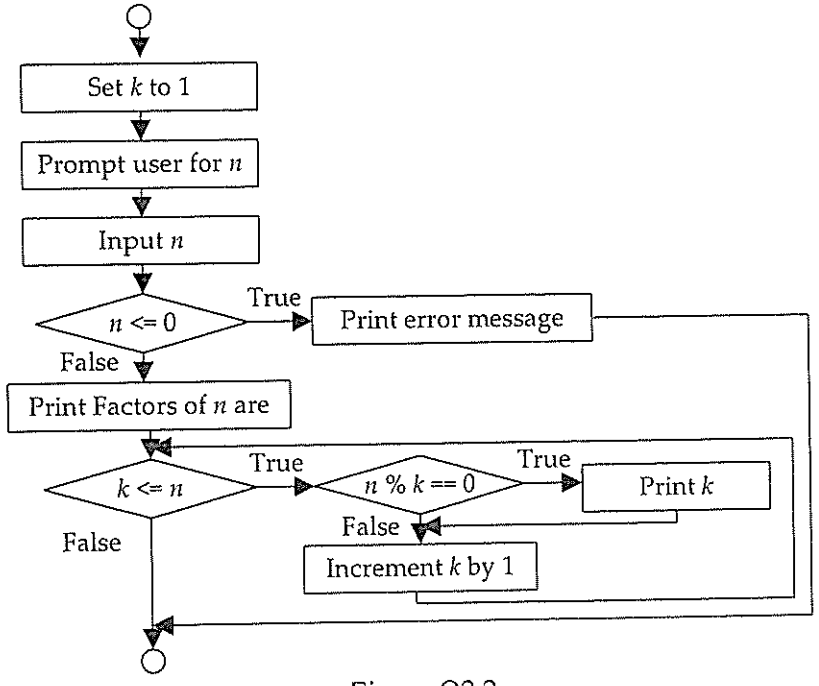

Figure Q2.2

Based on the flowchart, write a complete C program [15 marks]

Continued...

Question 3

(a) Using appropriate standard library functions, perform each of the following tasks:

(i) To display the value of 5 raised to the power 4.

(ii) To copy the string "welcome" into a character array called `string`.

(iii) To determine the length of the string "hello world!", and assign the value to `n`.

(iv) To request for memory space dynamically for 10 integers, and assign the starting address of the allocated memory to an integer pointer `ptr`.

[8 marks]

(b) The perimeter of a square with side t can be calculated by: $Perimeter = 4t$.

(i) Write a user-defined function called `findPm` that accepts a `float` variable `t` as function argument, and returns the calculated perimeter of a square. [5 marks]

(ii) Using the function `findPm` defined in part (i), print the perimeter of a square with side 6cm. [2 marks]

(c) Figure Q3.1 shows an incomplete program that inputs two integer values from user, and prints the larger value. The program consists of a user-defined function called `findLarger` that accepts two integers and a pointer of type integer as function arguments. The function compares the value of two integer arguments, and places the larger value at the pointer argument. The function does not return any value.

```
#include<stdio.h>
//(i) function prototype of findLarger [2]

int main(){
  int n1, n2, larger;

  printf("Enter two integers: ");
  scanf("%d%d", &n1, &n2);

  //(ii) function call to findLarger [2]

  printf("Larger value is %d", larger);
  return 0;
}
//(iii) function definition of findLarger [6]
```

Figure Q3.1

Based on the comments given in Figure Q3.1, complete the C program. [10 marks]

Continued...

Question 4

(a) A text file named *data.txt* contains noon time temperature recorded at City A in June 2017. The number of readings stored in the input file is not known. It is required to display all readings and total number of readings on the monitor screen.

If the input file cannot be opened successfully, an appropriate error message should be displayed, and the program should be exited.

(i) Draw a flow chart that performs the above-mentioned tasks. [10 marks]

(ii) Based on the flow chart in part (i), write a complete C program. [10 marks]

(b) Figure Q4.1 shows an incomplete C program that writes an employee record from memory into a random access file called *record.dat*.

```
#include <stdio.h>

struct Employee{
  char name[20];
  int id;
  double pay;
};

int main() {
  struct Employee e={"Bryan", 1002, 4521.5};
  //(i) Declare and associate a file pointer with record.dat
  //    for write-only in binary mode [2]

  //(ii) Write the employee record into record.dat [2]

  //(iii) Close the file [1]
  return 0;
}
```

Figure Q4.1

Based on the comments given, complete the C program. [5 marks]

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